

FACILITATING CONVERSATION THROUGH SELF-INITIATED AUGMENTATIVE COMMUNICATION TREATMENT

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We examined the conversational skills of 2 adult males with severe motor and speech deficits resulting from cerebral palsy. A multiple baseline design across subjects was used to determine the effectiveness of an intervention strategy designed to teach them to use an augmentative communication system (Touch Talker) independently. The dependent measure was the number of conversation initiations relative to conversation reactions during spontaneous communication across baseline and treatment. The treatment included specific training on using the augmentative system to participate in communication. Once the intervention began, the production of conversation initiations accelerated at a rapid rate. The treatment program was effective in training the subjects to use the augmentative system to increase conversation participation. These results demonstrate that training on the operation of the device alone is not sufficient to ensure improvement in conversation performance, and that it is important to incorporate direct conversational treatment when providing instruction on the use of augmentative communication systems for severely speech-impaired individuals.

DESCRIPTORS: augmentative communication, cerebral palsy, conversation training, language

The relative absence of self-initiated communication and exploratory patterns of many individuals with severe disabilities may be attributable more to a lack of opportunity than to limited motivation and skills (Haskett & Hollar, 1978; Houghton, Bronicki, & Guess, 1987). This subpopulation often includes those with congenital physical disabilities (e.g., cerebral palsy), acquired neurogenic dis-

orders (e.g., stroke or head trauma), and progressive degenerative neurological disorders (e.g., Parkinson's disease). Not surprisingly, there is a large degree of heterogeneity in intellectual capability and communicative competence among these users of augmentative systems (Kraat, 1985; Light, 1988). Additionally, a lack of opportunity to exhibit self-determined behaviors by these persons often occurs because an effective communication system has yet to be developed (Guess, Benson, & Siegel-Causey, 1985). McDonald (1980) observed that deficiencies in communication skills frequently foster dependency and, therefore, have serious consequences for a range of activities associated with social interaction. To date, few studies have examined the effectiveness of current implementation strategies for teaching communication skills to persons with severe disabilities (MacDonald & Gillette, 1986) or to evaluate the effectiveness of training programs designed to instruct such individuals to use augmentative communication systems (Mirenda & Dattilo, 1987).

There are a number of augmentative commu-

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nication systems available; for example, Kraat and Stiver-Kogut (1984) described 27 different systems. These vary according to message storage capacity, message speed, and output capabilities, and span the continuum between simple word and letter boards to sophisticated computer driven systems. In recent years, these systems have been reduced increasingly in size and cost, making them available to many people (Ronski & Seveck, 1988). These systems have extensive memory capacities and can be programmed to meet the unique needs of the individual user. The primary advantage of applying these systems is that relatively long message strings can be retrieved with only a few key strokes; this results in more rapid responses within the conversational context (Blackstone, 1986).

There have been few studies of the impact of augmentative communication systems on the conversational skills of individuals with severe speech impairments. Ronski and Seveck (1988) observed that the development of communication skills follows a continuum beginning with the learner typically having a passive role in the communicative interaction. With practice, the learner can function as an active and equal member of the communicative partnership and exchange. Unfortunately, individuals using augmentative systems often do not learn conversation participation skills. For example, Farrier, Yorkston, Marriner, and Beukelman (1985) observed that a group of normal subjects required to use augmentative communication systems initiated fewer than 30% of the turns and produced fewer than 35% of the total words across interactions with speaking partners. Similarly, Light (1988) completed an extensive literature review and concluded that many individuals using augmentative systems occupied primarily a respondent role and seldom used conversational initiations in their communication (e.g., Calculator & Dollaghan, 1982; Harris, 1982; Light, Collier, & Parnes, 1985). Light (1988) stated that within many conversational dyads, patterns of turn taking, initiation, and conversation control are dominated by the unimpaired partner, whereas the individual using the augmentative system assumes the role of respondent. It is important to note that training has thus far focused

primarily on system use (e.g., system activation and message storage) rather than on specific techniques for expanding system use within conversation (see the review by Light, 1988). This lack of direct training in conversation participation may result in the continuation of the reduced conversation skills often observed prior to introduction of the augmentative system.

Based on observations of the aforementioned researchers and the recommendation by Hooper and Hasselbring (1985) that an augmentative communication system must allow the person to become an initiator of communication rather than be solely a respondent, we conducted an investigation to examine the conversational skills of individuals using an augmentative device. One set of variables Light (1988) identified as influencing the range and pattern of communication produced by individuals using augmentative systems in interactions with others is the dynamics of the intervention strategies employed to instruct the user in acquiring the skills to learn the system. Therefore, this study examined whether training devoted to enhancing self-initiated conversation can improve conversational ability directly.

METHOD

Subjects

Two male adults, with severe motor and speech deficits resulting from cerebral palsy, participated. The following general criteria were used for selection of these subjects: (a) difficulty in using speech independently as the primary mode of communication; (b) no effective augmentative communication currently used spontaneously; (c) motor ability sufficient to activate or point to any of the choices presented on the communication system display (direct selection capabilities); (d) ability to match objects to colored photographs or black and white line drawings; and (e) ability to see and scan well enough visually to identify accurately each of the individual items in an 18-item array.

John. John, age 21, was diagnosed as having cerebral palsy stemming from birth complications. John's cerebral palsy resulted in severe motor def-

icits requiring him to use a motorized wheelchair for mobility. Despite these severe motor deficits, John was able to point to and press desired sections of an augmentative communication board without special switching. The results of psychological testing indicated above average levels of social and cognitive development. A full-range IQ of 122 was observed on the Wechsler Adult Intelligence Scale (Wechsler, 1955). Achievement tests (e.g., Peabody Individual Achievement Test; Dunn & Markwardt, 1970) indicated academic skills at grade level, with particular strengths in math and reading. Finally, the results of the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981) placed John at the 89th percentile in terms of receptive vocabulary levels. The fact that John was enrolled as an undergraduate student at a local university provided further evidence of his high level of social and cognitive development.

John's speech and language skills were also relatively high. He communicated verbally during the sampling sessions with a high degree of intelligibility (determined by the number of utterances that a listener can comprehend) but at an extremely slow rate due to his severe motor impairment. Rate was determined by analyzing a sample of John's speech using an Apple/Visipitch 6095® interface coupled to an on-line video display of the acoustic signal. Duration of utterances was measured from the onset of the sentence to the offset and was compared to identical sentences produced by an unimpaired speaker. For example, the sentence "I went to class today" required a total of 9 s to produce, compared to less than 1 s required to produce this sentence by unimpaired speakers. This process significantly impeded John's ability to communicate. The slow rate of speech was very disruptive to the communication process because the listener had to wait a considerable length of time for John to complete an utterance. Although he was not using an augmentative device prior to this investigation, John participated in the training in an attempt to enhance his ability to communicate by increasing his production rate.

Carl. Carl, age 36, was also diagnosed as having cerebral palsy resulting from complications during

birth. His upper body coordination was fair, allowing him to throw and catch a ball, draw and paint, and press sections of an augmentative device without special switching. However, his cerebral palsy resulted in motoric deficits requiring him to use a wheelchair for mobility. Additionally, Carl had been institutionalized at 3 years of age because he had been identified as being mentally retarded, with reduced levels of performance in both cognitive and social tasks. A psychological evaluation conducted in Carl's residential setting resulted in a diagnosis of profound mental retardation with an IQ of 14. Additionally, the psychological report indicated that his social and emotional development was similarly retarded. Finally, because of his reduced language skills, the occupational therapist recommended that he be trained using manual and visual instruction (for light manual tasks) while minimizing verbal interaction.

The results of a speech and language evaluation revealed that his verbalizations were extremely limited; identifiable words included only "mama" and "no" and a high-pitched vocalization used to signal protest. He refused to participate in standard comprehension testing. At the time the treatment was initiated, Carl possessed a simple word board consisting of photographs and line drawings. However, Carl failed to use this device during the sampling sessions conducted at the speech clinic or at his residence. He participated in this study to develop skills needed to use an augmentative communication system frequently and consistently.

Apparatus

The Touch Talker augmentative system uses hardware and software (Minspeak) to allow personalized programming of messages. The hardware includes a keyboard and display monitor. The software facilitates flexible programming, including symbol location and symbol-location correspondence. Individual users can retain messages in groups and quickly present these messages. For example, users can store a group of messages associated with recreational activities in a specified location of the system. These prewritten messages can then be retrieved at various times. The flexibility of the system

was the primary reason this particular augmentative communication system was chosen for the proposed investigation. It should be noted that neither subject had any prior familiarity with this device.

In addition, the Touch Talker incorporates synthetic speech as a mode of output. According to Ronski and Seveck (1988), systems containing speech output allow the user to communicate with persons in a different room, persons not looking directly at the symbol display, and persons who cannot read the symbol display. In addition to broadening the audience, speech output facilitates more normal social exchanges and seems to be highly motivating for many students (Hooper & Hasselbring, 1985).

Experimental Design

A multiple baseline design across subjects was used to examine the effectiveness of an intervention strategy designed to teach people to independently use an augmentative system to become more active conversation participants. Observations were conducted in the residence as well as in the clinic to investigate the important interaction between the users and their family and friends (Berry, 1987).

Experimental Conditions

Baseline included (a) a phase in which initial levels of spontaneous speech were assessed and (b) operation instruction for the augmentative system. The intervention condition included self-initiated conversation treatment. Sampling and training sessions (1 hr) were conducted two to three times weekly for each subject for 3 months. Observations were completed during the training sessions and once per week at each subject's residence. All sessions were videorecorded using a Panasonic AV-176® VHS camcorder.

The procedures were implemented by two trainers. One trainer was a specialist in communication disorders, and the other demonstrated expertise in therapeutic recreation. The responsibilities of the team included (a) training the subjects to operate the Touch Talker system, (b) teaching the subjects to introduce topics during conversation, and (c) providing leisure education to encourage self-de-

termined behaviors based on subject preference (see Dattilo & Camarata, 1988, for a detailed description and rationale for structuring the team).

Baseline conditions. The first baseline phase involved observing the subjects during speech sessions (two observations per week) and at the residence (one observation per week). During this baseline phase, initial speech assessments were conducted. This first baseline was conducted at home and in the clinic until stable levels of conversation initiations were demonstrated for each subject. The second baseline phase involved Touch Talker training sessions designed to familiarize each subject with the augmentative device and the Minspeak software used to store and produce the actual sentences. Because the system allows the individual to select specific codes for message entry, each subject participated in the message selection process. Once the subjects learned how to use the system and stabilized their behaviors, the self-initiated conversational intervention began.

During the Touch Talker baseline phase, messages for each subject were programmed into the augmentative device. All trainer prompts in this phase pertained to the mechanical operation of the device. Because of Carl's limited cognitive skills, his message inventory included five sentences to request participation in different recreational activities (playing ball, listening to music, painting, playing cards, and eating snacks). John's message inventory was much larger, including sentences grouped into five primary topical areas (dining out, music discussion, school phrases, specific activities, and general conversation). John could retrieve a topical area containing numerous preprogrammed sentences that allowed him to engage in a conversation relative to that topic (e.g., for dining: "I want a salad," "This tastes good," "I am full, let's go"). This second baseline phase was also conducted in the home and clinic settings until stable levels of conversation initiations were demonstrated for each subject and until they demonstrated the ability to use the augmentative system by independently activating the device during conversation at least five times per session.

The initial baseline was conducted to verify that

the patterns of low conversation initiation reported in the literature were evident for the 2 subjects. The second baseline was completed to determine whether familiarization with an augmentative system in the absence of specific conversation training improved conversation patterns. Although these two baseline phases were different in terms of use and familiarity with the system, both occurred prior to the intervention designed to affect the dependent measure.

Self-initiated conversation treatment. The self-initiated conversation intervention included individualized treatment designed to increase the use of spontaneous conversation skills that occurred with a low frequency during the baseline phases. The subjects were informed that they were in control of the session and that the trainer would respond to their requests produced from the system (see Koegel, Dyer, & Bell, 1987). The trainers then arranged recreational materials in view of the subjects and responded immediately and appropriately to any subject request. Prompts such as "what do you want?" and "tell me what you want" were initially used with Carl. John did not require any prompts of this type; instead, he was told to use the device to make requests or to interrupt the trainer during conversation. In all cases, the appropriate response was provided by the trainers. All trainer prompts during this treatment pertained to conversation participation. The prompts were discontinued after the second training session, and neither subject required subsequent prompting. The self-initiated conversation training continued until the proportion of conversation initiations exceeded 50% for at least two consecutive sessions.

Assessment of the Integrity of the Experimental Conditions

To evaluate the integrity of the independent variable, a second observer observed clinic sessions during baseline and treatment to verify that the above procedures were followed. That is, the second observer monitored the first baseline to ensure that no prompts were provided, monitored the second baseline to ensure that all prompts pertained only to the mechanical operation of the system, and

monitored the treatment sessions to ensure that prompts pertained to conversation participation.

Data Collection

Dependent measures. The conversational skills demonstrated by the subjects during the sessions were observed by the investigators. Specifically, the number of subject communicative initiations and reactions were recorded. Initiations were those intelligible productions using speech and/or the augmentative device that were not directly contingent on the partner's communication and served to introduce new information into the conversation. Reactions were those communications immediately following (within 2 s) partner verbalizations and served to affirm and/or modify the semantic aspects of the partner's communication. In pragmatic terms, communication reactions were defined as communications following a previously established topic, whereas initiations were defined as communications that introduced a new topic in the conversation (see Halliday, 1972). For example, when John produced the message "I like that record" following a sentence "I like this Bob Marley album" given by the clinician, the subject's communication was classified as a reaction and the clinician's communication was classified as an initiation. Because the number of opportunities for communication varied across sessions, a ratio of initiations to reactions was calculated to facilitate comparison across sessions.

Observations were conducted during the clinic and home sessions. During clinic sessions, trainers engaged subjects in general conversation. Home observations were made to determine whether the behaviors observed in the clinic appeared in the home setting. These home observations occurred when subjects engaged in typical conversations with caregivers, friends, and family members. Natural conditions were not modified during observations across settings. These observations during general conversation were consistent across the two baseline phases and the conversation intervention. The home probe measures were identical to the measures obtained in the clinic setting.

Settings. The actual sampling sessions were

completed in two locations: the speech clinic and each subject's residence. For Carl, the primary residence was a residential care facility, whereas John resided in a dormitory on the university campus. In addition, the trainers accompanied John when he wished to conduct activities outside his dormitory room during the residential sampling session (e.g., dining at a restaurant). There were typically three sessions conducted per week: two at the clinic and one in the residential setting. Occasionally, the residential visits were not conducted because of scheduling difficulties with parents, caregivers, friends, or subjects. However, no more than five clinic sessions occurred between residential visits.

Interobserver Training and Reliability Measures

Observers were trained to follow the procedures for classifying communications as initiations or reactions (Halliday, 1972; Searle, 1969) by coding a videotape of individuals with and without impaired speech engaging in conversation. Instruction was provided by the second author, who identified the classification categories and provided immediate feedback while the observers were in the process of coding. Following this intensive instruction, the observers were required to independently code a different series of conversations. The second author subsequently coded these same conversations. Prior to initiation of the investigation, all observers were required to complete the coding with 95% or better interobserver agreement with the second author's data. Agreement in this observer training was calculated by dividing the number of point-by-point agreements by the total number of utterances coded and multiplying by 100.

Initiations and reactions coded during the baseline and training sessions were classified independently from videotapes by a trained primary observer (the second author) and a trained reliability observer (a graduate student who had undergone the aforementioned training for coding). Interobserver checks were made on 12 occasions throughout the study. A minimum of two interobserver checks were made per subject per phase. Agreements were noted on those communications iden-

tified by both coders as initiations or reactions. Disagreements were observed when each of the coders scored a communication differently. (There was little difficulty in identifying communications; the transcripts for both reliability observers included identical numbers of productions.) Reliability calculations for each were derived by dividing the total number of agreements by the sum of the agreements plus disagreements, multiplied by 100. The mean level of interobserver agreement for communication initiations was 89.3 (range, 85.1 to 100) for John and 91.6 (range, 84.5 to 100) for Carl, whereas the interobserver agreement mean score of communication reactions was 91.7 (range, 82.2 to 100) for John and 93.6 (range, 89.4 to 100) for Carl.

Social Validation

To determine whether observed changes in behavior were socially valid (Wolf, 1978), informal supplemental measures of social validity were applied by interviewing the trainers, friends, and caretakers of the subjects. The interview required caregivers, clinicians, and friends to describe each subject's communication behavior. To avoid bias in this assessment, the second author simply asked the trainers, friends, and caretakers to comment on their interactions with the subjects. All characteristics identified by two or more of the trainers, friends, and caretakers were included in the results (see Schreibman, O'Neill, & Koegel, 1983).

RESULTS

Figure 1 displays the percentage of conversation initiations for each subject across all phases of the investigation. This percentage is the ratio of initiations to total communication responses during each session. John remained within the levels observed across the initial sampling baseline phase during the Touch Talker training baseline phase, whereas Carl's percentage of initiations appeared to stabilize at a slightly higher level during the Touch Talker training baseline. Both subjects' percentage of conversation initiations increased markedly after the self-initiated conversational intervention phase be-

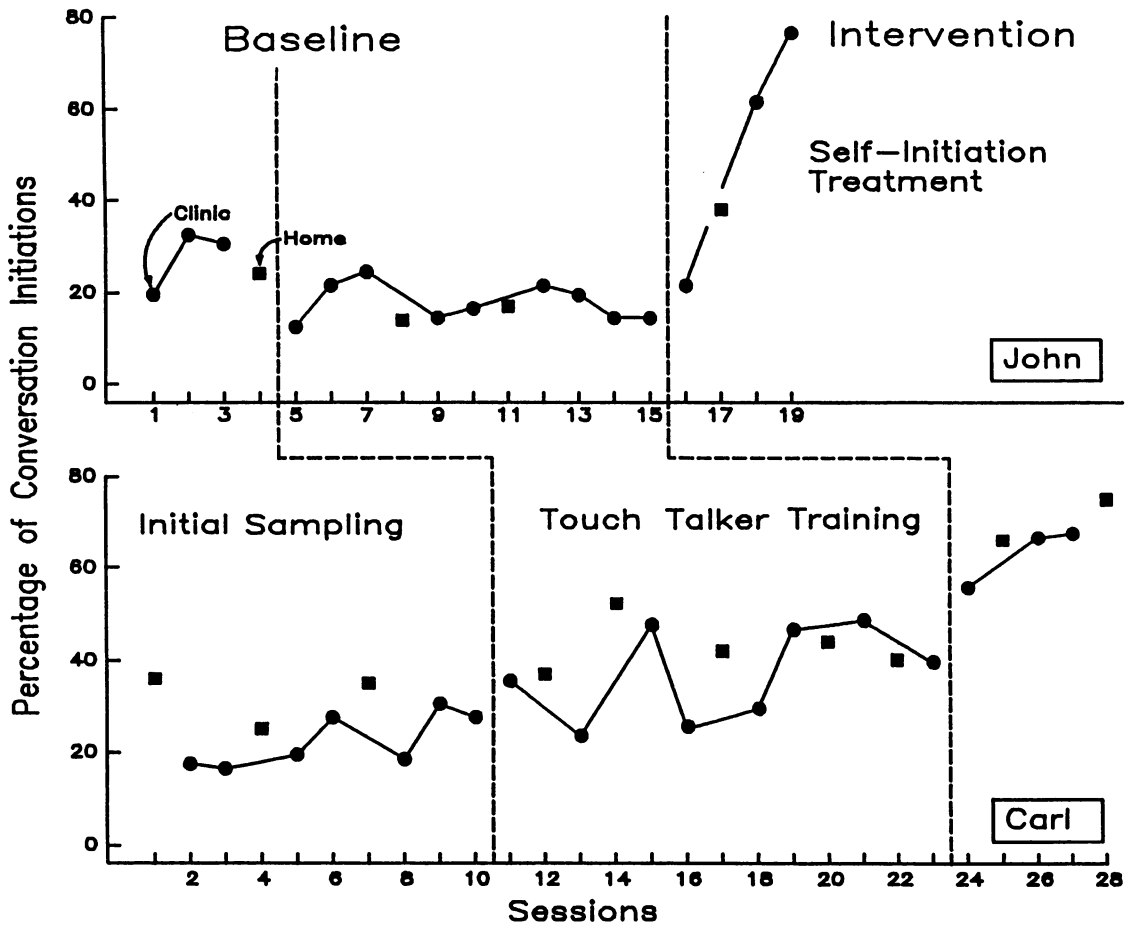


Figure 1. Percentage of conversation initiations for John and Carl across baseline and intervention phases.

gan, demonstrating direct replication across subjects.

John

The mean percentage of initiations for John during the initial sampling baseline phase was 26%, whereas the mean percentage of initiations during the Touch Talker training baseline phase was 17%. No trend in John's percentage of initiations was observed during the initial sampling and the Touch Talker baseline phases. A slight latency effect was observed following the onset of the self-initiated conversational intervention phase. There was a change in level for the dependent measure after the first session of the intervention phase: the percentage of initiations increased to 38% and the behavior indicated a dramatic acceleration trend. During the

self-initiated conversational treatment phase, the overall mean production of initiations rose to 48%, more than doubling the mean percentage of initiations observed during the baseline phases. The mean number of total productions was 136.5 ($SD = 23.5$) during the first baseline, 144.7 ($SD = 32.0$) during the second baseline, and 181.0 ($SD = 15.0$) during the training sessions. The mean number of initiations was 35.0 ($SD = 3.3$) during the first baseline, 24.7 ($SD = 6.3$) during the second baseline, and 88.0 ($SD = 37.5$) during conversation initiation training.

Carl

During the 10 sessions of the initial sampling baseline phase, the mean percentage of communication initiations for Carl was 25%, with a mean

of 228.8 total communications ($SD = 61.4$) and 55.4 initiations ($SD = 15.2$) during these sessions. His percentage of initiations stabilized during this baseline phase, demonstrating no apparent trend. A similar pattern was evident during the Touch Talker baseline phase; Carl's behavior appeared to stabilize toward the end of this phase and there was no apparent trend. During the 13 sessions of this phase, the mean percentage of Carl's initiations rose to 39%, with a mean of 278.0 communications ($SD = 79.7$) and 110.2 initiations ($SD = 43.4$). There was a change in level once the self-initiated conversational treatment began. The percentage of initiations increased immediately to 55%. The mean production of initiations rose to 67% during the intervention phase, an increase of nearly 30% over the Touch Talker baseline level and 42% over the initial sampling baseline. The mean number of communication responses was 225.8 ($SD = 32.4$), whereas the mean number of initiations was 148.6 ($SD = 9.3$) during conversation initiation training.

Home Probes

The percentage of conversation initiations during sampling at the residential setting during the baseline phases and the treatment phase is represented by the solid squares in Figure 1. It is clear that performance in the residential setting was within the percentages observed in the speech clinic across the baseline and the intervention. Thus, there is some evidence that the behaviors observed in the clinic may have generalized to each subject's pattern of conversation outside the clinic.

Social Validation

The supplemental measures of social validity indicated that positive social consequences were observed in both subjects following the self-initiated conversation treatment. Observers reported that John became a more active conversation participant and became more assertive in managing his own needs. For example, following the self-initiated conversation treatment, observers reported that John began placing his own orders for food items at a restaurant rather than relying on others. Additionally, observers reported that John used the aug-

mentative device to interrupt others, an indication that he had become more active in the conversation. Finally, observers reported an increase in both the speed and the frequency of production of John's sentences during conversations following the conversation treatment. Similarly, following conversation training, a reduction was reported in Carl's aversive vocalizations (e.g., high pitch, loud vocalizations), and a marked increase was noted in his use of the augmentative device to signal caretakers. Observers also reported a decrease in the number of repetitions required to comprehend Carl's productions. Finally, observers noted an increase in the variety of leisure activities Carl participated in following treatment. In both cases, observers reported increases in conversation participation and positive changes in social behavior after the conversation initiation training.

DISCUSSION

The results of our investigation reveal the importance of incorporating self-initiated conversational treatment when providing augmentative systems to individuals with severe speech impairments. In the two cases examined here, simply introducing the Touch Talker and providing instruction were not sufficient to shift the subjects away from the conversational role of respondent; rather, specific conversation initiation treatment was required before shifts in conversation behavior were observed. This finding was replicated across subjects, despite the large disparity in cognitive capabilities between these subjects. It is noteworthy that baseline levels of conversation initiation were uniformly low in both subjects across initial sampling and Touch Talker training and were consistent with previous reports of people with severe disabilities (e.g., Calculator & Dollaghan, 1982; Farrier et al., 1985; Harris, 1982; Light, 1988; Light et al., 1985). Indeed, in the present investigation, higher levels of cognitive function evidently did not ensure higher levels of baseline conversation performance, whereas following treatment lower levels of cognitive function did not preclude active conversation participation.

The changes in conversation patterns evident in the clinic were also observed in the home probes, suggesting that these procedures may be effective in developing conversation participation across settings. This observation is noteworthy because the difficulty of establishing at home the behaviors learned in a clinical setting is well documented (see Light, 1988, for augmentative system users; Spradlin & Siegel, 1982, for speech behaviors; Stokes & Baer, 1977). We speculate that the ability to initiate specific and consistent verbal outcomes, previously unavailable to the sender because of low intelligibility and/or slow rate of production, was highly reinforcing and therefore established very rapidly at home. The ability of a person to attain such verbal control has long been considered a critical step in the language acquisition process (Skinner, 1957) and proved to be an effective strategy in this study.

The results of the supplemental measures of social validity partially substantiated our interpretation. Although the cognitive and linguistic profiles of these subjects were quite different, significant changes were observed in the manner in which they both communicated within their everyday lives. For example, following the conversation initiation treatment, observers reported a marked reduction in Carl's use of high-pitched, high-intensity vocalizations at home and at the speech clinic. It may be that acquiring alternative means of signaling others and initiating conversations served as a replacement for the less desirable behavior of emitting a high-pitched, high-intensity vocalization. Such a decrease in undesirable behaviors as more advanced communication skills are acquired has been reported elsewhere (Carr & Durand, 1985) and was an important aspect of social validity in the current investigation.

There are noteworthy limitations to this project. First, the intervention was completed within the time constraints of a university semester, restricting opportunities for longer term assessment of intervention and generalization. Further investigations should extend the number of observation sessions during the intervention phase. In addition, the multiple baseline was completed across only 2 subjects,

thereby producing only one direct replication of intervention effects. There is a need to replicate and extend these findings with additional individuals with severe speech impairments. Moreover, the ultimate goal for establishing these conversational skills is that the individual will have the means available to become an equal partner in conversations, both as an initiator and as a reactor.

Finally, we believe that incorporating specific instructions on conversation participation directly into the treatment procedures will prove to be an important part of the intervention for individuals with a wide variety of speech and language handicaps. The rapid use of the target behaviors observed in the home probes suggests that targeting changes in conversation behavior may have the potential to produce rapid generalization for many different kinds of speech and language problems. Therefore, future research should explore more fully the effects of adding specific instructions on the use of targeted behaviors within conversation across a variety of behaviors and subject types.

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